Because there is no other basis for estimating the wholesale marketing budget of the future, Verizon VA has used its 1999 advertising budget as a reasonable proxy. Given that the relative importance of the wholesale market should grow over time, it is reasonable to assume that today's advertising budget will be reallocated to serve that market. Conversely, the advertising budget will not drop when Verizon VA faces new retail and wholesale competition. Indeed, when MCI and Sprint began competing with AT&T years ago, AT&T's advertising budget did not drop; to the contrary, AT&T witness Mr. Kirchberger suggested that AT&T's advertising expenses skyrocketed. (Tr. at 3722, 3708.) Thus, using an expense relationship based on Verizon's 1999 retail advertising budget is a fair estimate of its forward-looking wholesale advertising budget.

e) Verizon VA's Treatment of Non-Recurring Cost Revenues and OSS Costs in the Development of ACFs Was Appropriate.

AT&T/WorldCom also attack the validity of Verizon VA's ACF calculations on the ground that Verizon VA removed the ongoing costs of OSS and an amount equal to the revenues associated with non-recurring activities out of the expenses it used to calculate its ACFs. As we explain below in discussing Verizon VA's non-recurring cost study, Verizon VA removed non-recurring revenues from its ACFs to avoid double recovery of non-recurring costs in its recurring rates. The adjustment AT&T/WorldCom recommend — eliminating entirely this subtraction of non-recurring revenues (*see* AT&T/WCom Ex. 12 at 93-94) — is simply a function of their misguided position that almost all non-recurring costs should be recovered on a recurring basis. Their position on OSS costs is equally perplexing. Verizon VA backs ongoing OSS costs out of the ACF expenses because Access to OSS is a separate UNE; if the related OSS costs are properly driven to that UNE, then users of that UNE will appropriately pay its costs. (*See* VZ-VA Ex. 122 at 245.) Petitioners argue that such costs either should not be recovered at all or

should be recovered through an end-user charge or at best as an ACF. But, as discussed in Part IV below, the costs of Access to OSS should rightfully be recovered from CLECs like all other UNE costs.

IV. VERIZON VA'S RECURRING COST STUDIES

A. Loops

The costs produced by Verizon VA's studies are based on providing loops in a forward-looking, TELRIC-compliant network that is designed to serve all demand within the Commonwealth.[73/] Verizon VA's studies use a network design that preserves certain physical characteristics of Verizon VA's existing network, because those characteristics represent the most sensible measurement of the physical characteristics of a forward-looking network capable of serving Virginia demand. At the same time, in compliance with TELRIC principles, Verizon VA assumed the wholesale replacement of technology in its entire existing network with a forward-looking technology mix. In all cases, Verizon VA's decisions concerning its network and model inputs were informed by Verizon VA's experience operating a network capable of serving Virginia customers. Thus, unlike the MSM, Verizon VA's loop cost model produces the forward-looking costs of providing unbundled loops in a functional network that can actually serve the Virginia customer base.

AT&T/WorldCom's criticisms, which portray Verizon VA's approach as an effort to recover embedded costs and as fundamentally biased, ring hollow. In several cases, the network assumptions used in Verizon VA's loop cost studies are significantly more forward-looking than those used in the MSM, and in all cases, they are more realistic in valuing a potentially

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[73/] Verizon VA's loop studies are addressed in VZ-VA Ex. 107 at 34-40, 78-178; and VZ-VA Ex. 122 at 59-147.

functional network. In formulating the key assumptions for assessing loop costs, including line counts, structure sharing, plant mix, utilization, and loop investment, Petitioners use hypothetical data designed solely to lower costs, without regard to whether they have any grounding in actual reality or even theoretical possibility. Verizon VA has provided the Commission the only reliable, testable approach and inputs for modeling those costs.

1. Description of Verizon VA's Loop Cost Model

To develop the forward-looking costs for all the UNE loops that it offers,[74/] Verizon VA used a "capacity costing" approach. This approach is, as Verizon VA witness Joseph Gansert explained, "methodologically extraordinarily different" from, and far more reliable than, the MSM. (Tr. at 4347.) The MSM undertakes the extraordinarily complex and inherently unreliable task of simulating the assembly and tallying the costs of every piece of an imaginary network and divides this total cost by a projection of total loop demand to produce UNE rates. This abstract modeling process is inherently hypothetical. As Mr. Gansert noted, "[i]n my 30-year career, I have never seen a model that could effectively simulate the network and produce dollars that accurately represented what actually came out." (Tr. at 4348.)

Verizon VA's capacity cost model is designed to determine an average, representative cost of providing one loop — *i.e.,* one unit of network capacity. It was not necessary for Verizon VA to calculate the total cost of the network to determine the costs of this representative, model loop. Rather, as Verizon VA witness Gary Sanford explained, Verizon VA's cost model

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[74/] Verizon VA offers two- and four-wire analog loops, off-premise extension unbundled loops, ISDN/BRI (two-wire digital loops), digital four-wire (56 and 64 Kbps) loops, two- and four-wire customer-specified signaling loops, DS1/ISDN PRI loops, DS3 high capacity loops, xDSL-compatible loops, subloops, and dark fiber loops.

"identif[ied] each component that is utilized by a loop, . . . and for each component we identified the investment and divide[d] it by the capacity [of that component] to arrive at an investment per unit of capacity." (Tr. at 4104.) Verizon VA then took a weighted average of the investments for the "typical" loop in each Ultimate Allocation Area (UAA) (and then for the UAAs in each wire center) to produce the average loop investment for each wire center in Virginia.

More specifically, this cost analysis is comprised of the following key steps: first, Verizon VA identified the relevant physical characteristics of the "typical" loop in each UAA. To do this, Verizon VA used data regarding the average feeder length, maximum distribution length, and the predominant structure type used in each UAA, which was collected as part of a comprehensive, multi-year network survey performed by Verizon's outside plant engineers throughout Virginia. Other data used to determine the relevant characteristics of the typical loop in each UAA included up-to-date data concerning the number of distribution areas and working lines in each UAA and wire center. (VZ-VA Ex. 107, Attachment B at 28-31.)

To determine the average investment for the "representative" loop in each UAA, Verizon VA fed this data into its loop cost analysis model (LCAM). For each component of the loop, LCAM applied per-unit investments based on actual Verizon VA data, with appropriate forward-looking adjustments. Verizon VA also made the important assumption that the forward-looking network would take advantage of the efficiencies of deploying fiber-based digital loop carrier systems on longer or more concentrated feeder routes. The specific parameters of this assumption for longer routes were based upon a sensitivity analysis performed by Verizon VA in order to determine the feeder length at or beyond which it is more cost-effective to deploy fiber facilities. (*See* VZ-VA Ex. 107 at 95-97.) Verizon VA's loop cost studies assumed that Verizon VA's fiber deployment conformed to these efficient assumptions throughout the entire network,

and thus produced the costs of loops that reflect a far higher degree of fiber than exists in Verizon VA's actual network today or is expected to exist anytime in the foreseeable future. (*See* VZ-VA Ex. 107 at 94.)

Using this data, Verizon VA calculated the average cable investment per loop for each UAA and then determined the weighted average cable and structure investment per loop across all UAAs within each wire center. For fiber-fed loops, Verizon VA's model also calculated and added on the appropriate, forward-looking electronics investment for each type of loop. This was calculated by identifying the appropriate remote terminal size needed to serve the working lines in each UAA and distribution area. The electronics investments also reflect assumptions concerning the forward-looking mix of IDLC and UDLC in the network.[75/]

This approach allowed Verizon VA to use reliable, valid data as the basis for every input and assumption in its loop cost model. The inputs are forward-looking and reflect the needs of a robust functional Virginia network. There is no basis in the record for the Commission to rule otherwise.

[75/] The model also applies the various ACFs, discussed above, and the utilization factors, discussed below, to the average cable, supporting structure, and electronics investments per wire center, in order to produce annualized loop costs for each wire center. Those annualized costs were weighted by the relative proportions of copper and fiber in the wire center and the number of working lines at each wire center to produce jurisdiction-wide or density zone-wide composite loop costs.

2. The Network Assumptions Underlying Verizon VA's Loop Studies Are Forward-Looking and TELRIC-Compliant.

a) The Data from Verizon's Engineering Survey Are a Valid Part of the Choice Set for the Forward-Looking Network.

As previously noted, Verizon VA's loop cost model relies on, among other items, data culled from a detailed engineering survey of Verizon VA's network that was performed, at great expense and effort, between 1993 and 1995.[76] Because the survey looked at Verizon VA's network as it existed at that time, AT&T/WorldCom insist that Verizon VA's reliance on the data is impermissible and that the resulting cost studies "are not forward-looking at all."[77] (AT&T/WCom Ex. 12 at 12.) This is simply a nonsequitur. The Commission has recognized that a TELRIC cost study can consider "fundamental" elements of "existing network design."[78] And as explained above, economic principles clearly allow an incumbent to choose to "redesign" the forward-looking network to include features of the existing network, if those features are efficient and forward-looking — in other words, elements of the existing network are a valid part of the "choice set" that the incumbent may decide are most efficient to use. (Tr. at 2907

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[76] While the engineering survey collected several types of information, Verizon VA used it only for determining the typical loop lengths, copper feeder cable sizes, and structure types (*i.e.*, aerial, buried,or underground) in each UAA. (VZ-VA Ex. 122 at 62.)

[77] Petitioners also attempt to devalue the survey by suggesting that Verizon's engineers were confused when they filled it out or provided only interim data that should not be used. (AT&T/WCom Ex. 12 at 14.) There is nothing to these points, as Verizon VA has explained. The relevant questions asked by Verizon VA's engineers demonstrated that they understood the point of the survey overall and that, where clarification was needed, it was sought and provided. The survey responses thus were extremely reliable, and none of the data used in Verizon VA's loop cost studies could be characterized in any way as interim. (VZ-VA Ex. 122 at 67-71.)

[78] FCC Reply Brief at 4-5; *see also Local Competition Order* at 15848-49 ¶ 685 (TELRIC prices should be based on efficient technology that is compatible with "existing infrastructure" and should take "existing network design" into account.).

(Shelanski).) As Dr. Shelanski observed "[t]he goal of the long run economic analysis is to see what is efficient over time, not to see how much you can change over time." (Tr. at 2900.)

The loop routes and structure that Verizon VA has placed in the real, functional network in Virginia *are* efficient and provide the best estimate of what *any* wireline carrier today, or at any point in the future, would build to serve demand in the Virginia network given the static location of the network's wire centers and customers, the geography of the state, and the myriad municipal requirements and zoning laws that dictate placement and type of cable structure and support. It is true that, as Commission staff noted, no formal model "optimization run" was performed to ensure that the existing routes or structure mix produced the cost-minimizing effect. However, as Dr. Tardiff explained, the "cost minimizing mix [in Verizon's studies] is based more on experience than actual runs in the model." [79/] (Tr. at 3101.)

Mr. Gansert testified that in building the routes in Verizon's networks, the company's engineers "follow[ed] economic practice," and that the existing routes, cable sizes, and structure represent Verizon VA's experience concerning the most efficient means of reaching its customers, responding to the development of customer demand, and addressing the challenges of the state's particular geography and density. (Tr. at 4351.) As Mr. Gansert noted, the feeder and distribution routes thus are, "if not perfect, the best estimate that one could ever make of the routes needed in Virginia." (Tr. at 4349.) There might be isolated routes that would produce a lower cost in a model run, but, "it borders on a little preposterous to suggest that a theoretical hypothetical abstract algorithm could create better routes" than those that Verizon VA has laid over time to meet real network needs. (Tr. at 4349.) This is particularly likely to be the case

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[79/] As Dr. Shelanski observed, "there's nothing that says a forward-looking cost study needs to be based on a computer algorithm." (Tr. at 3140.)

when the hypothetical algorithm sponsored by AT&T/WorldCom in the MSM does not even attempt to take into account the location of actual rights of way, geographical features, municipal ordinances, and other critical variables that constrain and, in many cases, dictate placement of cables in a real network. (Tr. at 4349.)

Moreover, no evidence demonstrates that any substitute route design or structure mix would be more efficient than anything in the existing network. Petitioners vaguely suggest that there could be inefficiencies hidden in this network and that, for example, changes in road locations and similar developments might provide opportunities to use a shorter route than the one reflected in the Verizon engineering survey. (AT&T/WCom Ex. 12 at 15.) But Petitioners provide not *one* example of such a route, nor any explanation of why similar developments might not require longer, more expensive routes. In the same vein, Petitioners fail to identify any location in the network where an alternative structure type should be substituted. This is not surprising, given that Verizon VA's network uses large amounts of aerial cable in its network, which is the least expensive structure type. AT&T/WorldCom's hypothetical new entrant would never be able to replicate the use of aerial cable in Verizon VA's network, especially given the trend toward municipal requirements to use buried cable, which is a more expensive structure type.[80/] (VZ-VA Ex. 122 at 65.)

In truth, of course, even if one or two such examples *could* be identified, there would be no reason to scrap the network as a whole: the cost savings that could be achieved across the

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[80/] Petitioners criticize Verizon's engineering survey for using buried cable as the default structure type where engineers failed to specify the predominant structure in a given UAA. But in the "overwhelming majority" of cases the engineers did specify the cable type, and buried cable therefore was rarely assumed. (VZ-VA Ex. 122 at 70.)

entire network merely by shortening one or two routes is less than negligible.[81/] Moreover, actually changing routes to take advantage of a new road that would, for example, allow a shorter route to be built, likely would involve costs so unreasonable as to overwhelm any superficial cost savings. New routes built today — taking advantage of the new roads Petitioners hypothesize — would, for logical consistency, have to reflect the many factors (such as municipal requirements that new cable routes be underground or buried and restrictions on the placement of new cable in historical and environmental preservation areas) that make the establishment of new routes much *more costly* and much *less efficient.* Moreover, if Petitioners really contend that every route in the network actually would be physically built anew over new paths, the construction costs, excavation costs, and material costs would be *enormous.* (*See* VZ-VA Ex. 122 at 64-65.) As Dr. Shelanksi observed, it is "manifestly obvious that the costs of changing the route structure would be enormous [and] that it [is] not something that would be even remotely efficient to do, no matter how long a horizon you look over." (Tr. at 2946.)

Finally, Petitioners have not even pretended to suggest a specific adjustment to Verizon VA's forward-looking costs in conjunction with their criticism of Verizon VA's existing loop lengths; they simply assert that the Commission should reject Verizon VA's loop cost model altogether. This assertion is particularly absurd because the cable routes produced by AT&T/WorldCom's own MSM are not very different in length from those in Verizon VA's network once the MSM's line counts have been adjusted to reasonable levels. As Mr. Gansert observed, "[t]here has been a lot of blather in these proceedings about how inefficient our network is, but I would suggest you look at the lengths of the feeder and distribution and the

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81/ Moreover, changing a handful of routes or structure types throughout the network would have minimal, if any, impact on the *average* loop data per UAA used in LCAM. (VZ-VA Ex. 107 at 173.)

loops that the MSM produces. It isn't any different than ours [if proper line counts are used]." (Tr. at 4350.) Indeed, once line counts are adjusted to reasonable levels, the MSM produces *longer* routes than Verizon VA's. (Tr. at 4350.)

b) Verizon VA's Assumptions Regarding Outside Plant Technology Mix Are Forward-Looking and Produce TELRIC-Compliant Costs.

Verizon VA's assumptions regarding the technology mix in its model are aggressively forward-looking. Thus, the forward-looking network used for Verizon VA's cost studies differs markedly from the existing Virginia network and indeed from any real network that is likely ever to exist in Virginia.

(1) Verizon VA Assumed Far More Fiber for Cost Study Purposes Than Exists in the Embedded Network.

In order to comply with TELRIC requirements, Verizon VA assumed widespread deployment of fiber-fed loops in place of the existing copper feeder throughout its network. Thus, while 33% of the loops in Verizon VA's existing network are fiber-fed, Verizon VA assumed that more than 82% of all lines in the forward-looking network would be fiber-fed. (VZ-VA Ex. 122 at 76, 84.) Of course, while Verizon VA is methodically replacing copper with fiber where it makes sense, in truth Verizon VA will not actually achieve anywhere near 82% fiber-fed loops anytime in the foreseeable future. (VZ-VA Ex. 122 at 76.) Rather, the percentages assumed for study purposes are designed solely to reflect the most forward-looking, cost-optimizing technology mix that would exist if Verizon VA's entire network had been rebuilt to reflect the efficiencies of deploying fiber-fed digital loop technology. (Tr. at 2947-48.) Notably, Petitioners did not criticize or question Verizon VA's copper-fiber assumptions. This may stem from the fact that Verizon VA assumed a *much* greater percentage of fiber-fed loops in the network than Petitioners assumed in the MSM: the MSM assumes 60% copper feeder —

more than triple the amount of copper assumed in the Verizon VA model, and only slightly less than exists in Verizon VA's network today.[82] (Tr. at 4078.)

As previously noted, the deployment of fiber on longer routes in Verizon VA's cost studies is based on optimization runs performed within Verizon's model to determine the feeder length beyond which deployment of fiber feeder facilities would be more efficient than copper.[83] By substituting several different values for the so-called copper-fiber breakpoint, and measuring the resulting average statewide loop rate, Verizon VA determined that fiber feeder facilities would be assumed for all feeder routes 4,000 feet and longer.[84]

There also are circumstances in which it is economical to install fiber feeder facilities on feeder routes shorter than 4,000 feet. For single locations with a large number of customers (such as a large apartment or office building), it may be possible to locate a remote terminal inside a building, in which case fiber feeder facilities are the cost-optimizing approach, even if the feeder length is shorter than the breakpoint. (Tr. at 4462-63.) Verizon VA therefore made the forward-looking, efficient assumption that all customer locations with at least 150 lines (even if within 4000 feet of the central office) would be served by fiber feeder connected to a remote

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82/ The fact that the MSM makes this high cost assumption and still produces lower costs than Verizon VA's loop cost model should raise a red flag; something other than allegedly efficient network design in the MSM must account for this illogical result.

83/ Fiber facilities are more efficient in many instances because they do not require the same types of costly network components (*e.g.*, heavier gauge cables, load coils, and repeaters) that copper cables require on longer routes. (*See, e.g.*, VZ-VA Ex. 107 at 95.)

84/ In fact, the analysis showed that setting the breakpoint in the range of 3,000 to 5,000 feet of feeder length produced the lowest statewide average loop rates (with immaterial differences in that range). Verizon VA accordingly chose the middle of that range. (*See* VZ-VA Ex. 107 at 95-96.)

terminal located on the customer premises.[85] (Tr. at 4462-63; *see also* VZ-VA Ex. 107 at 95-96.)

(2) Verizon VA Assumed the Forward-Looking Mix of Integrated Digital Loop Carrier and Universal Digital Loop Carrier Necessary to Provide UNEs and Other Services.

Verizon VA also assumed a forward-looking mix of fiber-fed digital loop carrier (DLC) technologies for the cost studies. In the forward-looking network envisioned for cost study purposes, Verizon VA assumed that 70% of the fiber-fed loops (or 57.6% of all loops) would use integrated DLC (IDLC), and 30% of the fiber-fed loops (or 24.7% of all loops) would use universal DLC (UDLC). (VZ-VA Ex. 107 at 97.) This forward-looking assumption was informed by Verizon VA's experience regarding the mix that it has used in recent DLC deployments. (VZ-VA Ex. 107 at 97.) The deployment assumed by Verizon VA far exceeds anything that will occur in Verizon VA's real network; for TELRIC purposes, Verizon VA assumed that its mix for new DLC deployments was implemented network-wide.

Nonetheless, AT&T/WorldCom argue that Verizon VA's network construct is not sufficiently forward-looking. In Petitioners' opinion, the forward-looking network should reflect *none* of what AT&T/WorldCom characterize as the "less efficient analog Universal DLC," and thus all fiber-fed loop costs should reflect the generally lower costs of using only IDLC

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[85] The threshold of 150 working lines was designed to produce deployment of fiber only to customer locations where a 224-line remote terminal could be deployed with a cost-effective level of utilization. (Tr. at 4462.) The Commission inquired whether it might be more efficient to use copper feeder to serve distribution areas located between 4,000 and 12,000 feet of the central office but with fewer than 200 lines. As Mr. Gansert explained, such areas are rare and would have a marginal impact on average loop costs. (Tr. at 4466-67.) Moreover, it would be extremely burdensome to analyze the factors that would have to be considered to assess whether copper feeder might be appropriate for such individual distribution areas.

technology. (AT&T/WCom Ex. 12 at 20.) The problem, however, is that Petitioners wrongly assume that UDLC and IDLC are perfect substitutes for one another — that IDLC is simply a better and more advanced version of UDLC, so that the inclusion of UDLC in the network is necessarily an effort to recover the costs of "Verizon's outdated embedded infrastructure." (AT&T/WCom Ex. 12 at 20.) This contention simply ignores the inherent limitations of IDLC technology and reflects either the lack of experience that AT&T/WorldCom's witnesses have in running a local exchange network, or Petitioners' willingness to assume any position that produces lower model costs, even if the position would produce a network incapable of providing the relevant services.

It is uncontroverted that a functioning local exchange network must include UDLC technology. Regardless of whether stand-alone loops can be unbundled using an IDLC interface (which they cannot), UDLC is necessary to provide services *other* than unbundled loops. For example, as Mr. Gansert explained, UDLC is needed to provision the non-switched services that comprise more than 10% of Verizon's services. (VZ-VA Ex. 107 at 97-98; Tr. at 4160.) Moreover, UDLC is specifically necessary to provision non-switched services that connect a copper-fed loop to a fiber-fed loop. As Mr. Gansert explained, making that connection without UDLC is "a physical impossibility."[86/] (Tr. at 4079.) In addition, in some cases UDLC is more cost-effective than IDLC, depending on the size of the remote terminal. (Tr. at 4148, 4556.)

Petitioners simply ignore these very real needs for UDLC in all functioning, forward-looking networks. Instead, they undertake an extensive discussion claiming that IDLC can be

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86/ This need for UDLC makes the network that AT&T/WorldCom model in the MSM all the more puzzling. AT&T/WorldCom have proposed a model in which 60% of the loops are copper-fed but cannot be connected (other than through the switch) to any of the remaining 40% fiber-fed loops because of the complete lack of any UDLC. (*See* Tr. at 4079.)

used to provision unbundled stand-alone loops through a GR-303 interface[87] and that all unbundled loops therefore should reflect the lower costs associated with IDLC. AT&T/WorldCom are simply wrong. As Mr. Gansert explained, "the GR303 switching technology that we have today and the matching digital [loop] carrier technology we have today lacks some *fundamental functional capabilities* that would be needed" to provision unbundled stand-alone loops using GR-303. (Tr. at 4082 (emphasis added).) To insist nonetheless that a TELRIC study must price loops on the basis of such technology is plainly a departure from the requirements of the Commission's express rule that TELRIC cost studies must be based on "the most efficient telecommunications technology *currently available*."[88]

As the record reflects, the industry has been struggling for years to resolve the fundamental security, error-protection, OSS, and operational challenges that are preventing the idea of using a GR-303 interface to unbundle loops in a multi-carrier environment from becoming a reality. (*See, e.g.*, VZ-VA Ex. 122 at 77-80; Tr. at 4081-85, 4164-65.) As Petitioner WorldCom's own 1998 presentation on the potential for GR-303 unbundling recognizes, these problems include ensuring cross-compatibility of equipment from multiple vendors, the need to develop testing capabilities, and the absence of necessary OSS functionality. (Tr. at 4578-81; VZ-VA Ex. 155, Slides 9-10.) In fact, as demonstrated by document after document introduced by Petitioners at the hearing, discussions of GR-303 unbundling invariably include an acknowledgement of the very real implementation problems that have not been resolved.[89]

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[87] There are two types of IDLC interfaces: TR-008 and GR-303. AT&T/WorldCom do not claim that it is possible to unbundle individual loops using the TR-008 interface.

[88] 47 C.F.R. § 51.505(a)(1) (emphasis added).

[89] For example, during cross examination, counsel for WorldCom showed Mr. Gansert a copy of an SBC presentation that discussed GR-303 unbundling. As Mr. Gansert pointed out,

Although WorldCom's 1998 presentation concludes with the statement that "MCI is confident that all technical issues and challenges of implementing GR-303 IDLC systems can be successfully resolved," (VZ-VA Ex. 155, Slide 11), as Mr. Gansert pointed out, "that was in 1998, and it hasn't happened." (Tr. at 4580.) AT&T/WorldCom witness Mr. Riolo insinuated that this is because the ILECs lack the "incentive" to develop the necessary capabilities (Tr. at 4616), but the record shows otherwise. Indeed, Verizon has been an active participant — along with Petitioners — in an industry forum sponsored by Telcordia, the author of the GR-303 specifications, which has been trying to resolve these issues for years. (VZ-VA Ex. 122 at 78-80.)

Despite years of effort, Telcordia's GR-303 work program documentation for the year 2001 continues to reflect the fact that "*new requirements* are needed to support alternative distribution technologies . . . as well as services and applications (*e.g.*, . . .*local loop unbundling*)." (VZ-VA Ex. 157 at 1 (emphasis added); Tr. at 4585-86.) And the prospects for developing the ability to unbundle loops using the GR-303 interface are dimming, not growing. As Mr. Gansert explained, circuit switching technologies (including GR-303) are on the verge of becoming technologically obsolete due to emerging packet switching alternatives. Accordingly, equipment manufacturers have little incentive to commit the substantial development dollars necessary to resolve the remaining issues with GR-303 unbundling. (Tr. at 4084.) In fact, Mr. Gansert testified at the hearing that he was aware of no DLC equipment manufacturer that

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the SBC presentation does not suggest such unbundling is presently possible: it enumerates "GR303 deployment bottlenecks, and went through all the items that need to be developed in order to make it possible to deploy GR303 and to implement it." (Tr. at 4165, (citing WorldCom Ex. 118).)

Verizon VA could use to provision the remote terminal equipment necessary to unbundle loops using a GR-303 interface. (Tr. at 4583-85; VZ-VA Ex. 124, Attachment A.)

Thus, notwithstanding the ability of AT&T/WorldCom witness Mr. Riolo to engage in a lengthy discourse on the means by which, in theory, such IDLC GR-303 unbundling hypothetically *could* take place (Tr. at 4611-17), it is abundantly clear from the record in these proceedings that GR-303 unbundling remains in the realm of the theoretical. As Mr. Gansert noted at the hearing, Mr. Riolo's description is simply "what you would achieve if you overcame the obstacles." (Tr. at 4617.) However, Mr. Gansert explained, "it just doesn't exist as a practical reality." (Tr. at 4619.) Mr. Riolo ultimately was forced to concede one salient fact: Petitioners cannot show, as required under TELRIC, that any GR-303 unbundling solution has been deployed in *any* carrier's network anywhere in the country.[90/] Mr. Riolo admitted that, to his knowledge, "*[n]o* local exchange carrier . . . is presently unbundling with GR303 technology." (Tr. at 4619 (emphasis added).)

There is no basis for Petitioners' proposal that loop costs nonetheless be measured as if such GR-303 unbundling capabilities do exist and have somehow materialized for free.[91/] AT&T/WorldCom's suggestion that unbundled loop costs should be assessed on the basis of an IDLC-only network amounts to no more than another effort to generate lower UNE rates without

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90/ 47 C.F.R. § 51.505(a)(1); FCC Reply Brief at 6 (to be relevant for TELRIC purposes, a technological solution must at the very least be based on "equipment that is commercially available today — equipment that carriers are already using to upgrade and expand their networks); *see also Local Competition Order* at 15848-49 ¶ 685 (forward-looking costs should be based on the most efficient technology "deployed in the incumbent LEC's current wire center").

91/ Petitioners do not, of course, include in their proposed approach any allowance for the costs of the OSS or equipment solutions that would be necessary to provide unbundled loops using a GR-303 interface. (VZ-VA Ex. 122 at 82.)

regard to the Commission's rules or to whether their assumptions reflect a network capable of providing the necessary services.[92/]

c) Verizon VA's Assumptions About The Deployment Of GR-303 Satisfy (And Exceed) The Requirements of TELRIC.

Notwithstanding that GR-303 cannot be used for unbundling stand-alone loops, it may impact switch costs due to line concentration potential.[93/] Verizon VA assumed that 10% of all lines would be served using GR-303 IDLC. This assumption reflects a projected level of GR-303 penetration that might have been achieved during the study period under the GR-303 deployment guidelines in place when Verizon VA originally designed the cost studies filed in these proceedings.[94/] In fact, however, Verizon VA has *no* GR-303 in its network today (VZ-VA Ex. 107 at 91), and a 10% penetration is a far greater level than is likely ever to exist in the network given Verizon VA's current GR-303 deployment guidelines. (Tr. at 4087, 4154, 4156-57.) As noted above, packet switching technologies will likely replace circuit switching

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92/ It should be noted that Verizon VA's loop costs *do* give the CLECs a cost benefit that reflects the use of IDLC in the network, even though no stand-alone loops are provisioned on IDLC. Verizon VA's loop costs are based on the aggregate costs of copper, UDLC, and IDLC, thus providing CLECs with the benefit of the lower costs of IDLC where it can be deployed efficiently.

93// Because GR-303 IDLC cannot be used as a substitute for UDLC in a forward-looking network, assuming GR-303 in the network has only a negligible impact on loop costs. It is primarily relevant to switching costs because the GR-303 concentration feature reduces the number of switch interfaces needed to provide service to a given number of switched access lines. (Tr. at 4067-68, 4159.) Nonetheless, Petitioners tend to raise the concentration issue in the context of loop costs, together with their insistence on the possibilities of GR-303 unbundling.

94/ Mr. Gansert explained that, when Verizon originally designed its cost studies, its guidelines recommended deployment of GR-303 in new growth situations and might have produced as much as a 10% deployment over a three-year period. Since then, Verizon's guidelines have changed and no longer call for any deployment of GR-303. (Tr. at 4156.)

technologies in the foreseeable future, leaving little incentive for significant investment in GR-303 by DLC suppliers, and "no rational reason for [Verizon VA to] deploy a significant amount of GR303 in the future." (Tr. at 4087 (Gansert).) While Petitioners asserted that Verizon VA should have used a significantly larger amount of GR-303 in its network, Mr. Gansert explained that, in fact, were the company to redo the cost studies today, *no* GR-303 would be assumed because the company has no plans to deploy GR-303 and believes it is no longer the efficient, forward-looking technology choice. (Tr. at 4156.)

3. The Investment Data Used by Verizon VA Is Reliable and Forward-Looking.

Verizon VA's loop cost studies use Verizon's recently experienced investments (including Virginia-specific values for critical inputs such as placement of cables and conduit systems) with appropriate forward-looking adjustments. Where appropriate, Verizon VA averaged its actual investment data over several years to smooth out annual variations in the cost of installing facilities and to more accurately reflect network-wide, forward-looking investment. (VZ-VA Ex. 107 at 117-18; VZ-VA Ex.122 at 85-104.)

Although AT&T/WorldCom attempt to poke holes in some of the investment data provided by Verizon VA, they provide no evidence that any other figures might be more accurate. Notably, while AT&T and WorldCom have extensive networks both inside and outside of Virginia and offer both local and long distance services using cable, poles, conduit, and the like, neither Petitioner has provided any of its own data to demonstrate that Verizon VA's investment costs are allegedly high. In the absence of any affirmative evidence by Petitioners in support of other investment data, the only reasonable option before the Commission is to rely on the data provided by Verizon VA. Verizon VA's data also is far more relevant, reliable, and verifiable than the inputs that AT&T/WorldCom used in the MSM, which

represent an unverifiable mix of nationwide values, data from different vintages that has not been properly adjusted, and unrealistic assumptions about efficiencies that could be achieved in a forward-looking network. (VZ-VA Ex. 109 at 79-101.) In fact, Petitioners never show how such inputs are relevant to Verizon's costs in Virginia.

a) Verizon VA's Vintage Retirement Unit Cost Cable Investment Data.

The cable investment inputs in Verizon VA's loop, dark fiber, and IOF studies are drawn from Verizon's actual data concerning cable material and installation costs in the state of Virginia over the three most recent years for which such data was available when the studies were performed. Specifically, Verizon VA drew this data from its Vintage Retirement Unit Cost (VRUC) database for the years 1997-1999 and then made appropriate forward-looking adjustments. (VZ-VA Ex. 107 at 117, 216-17; Tr. at 4263.) Although AT&T/WorldCom questioned whether, in fact, VRUC data was derived from actual outside plant projects (*AT&T/*WCom Ex. 12 at 32), the record is abundantly clear that this is precisely the case. As Mr. Sanford explained, VRUC data is developed from actual cable installation projects in a given year and reflects the aggregate costs of each specific installation job. (VZ-VA Ex. 122 at 86-87.) VRUC data reflects the total material and installation costs for each cable job reported in the relevant year,[95/] broken down by cable type — aerial, buried, and underground — and also for fiber and copper.[96/] (Tr. at 4262.)

95/ The VRUC cable prices include loadings for the SAI cross-box, distribution terminals, drop wires, and NIDs. (Tr. at 4263-64.)

96/ Verizon VA's accounting data tracks actual cable investments by cable and structure type, but cannot track those investments by cable size. Thus, to assign the appropriate portion of cable investment to a particular cable *size*, Verizon relied on certain standard assumptions concerning relative cost differences among cable sizes. (VZ-VA Ex. 122 at 91.) These standard

AT&T/WorldCom nonetheless argue that alleged anomalies in the VRUC data cast doubt on its reliability. (VZ-VA Ex. 122 at 91.) But their arguments simply demonstrate a basic misunderstanding of the VRUC data. For example, they suggest that the Commission ignore the 1998 VRUC data because it reflects per-unit cable investments that are, for underground copper cable, more than 40% higher than the 1997 investments, and that the 1998 data accordingly is the product of "excessive and unsupported inflation" that "produce overstated average installed costs." (AT&T/WCom Ex. 12 at 33.) But the differences in VRUC data year-to-year are not the result of inflation adjustments at all. The variability reflects the fact that the total installed cost of a given year's cable placement projects may be higher than in the previous year because the jobs performed in the later year were more complex or time-consuming, or were performed under more adverse weather conditions, thus resulting in significantly increased installation costs. (VZ-VA Ex. 122 at 89.) Another basis for the year-to-year variability in the VRUC data is the time lag between when cable is installed and booked under the Commission's accounting rules, so that cable that is installed in year one may not be reflected on Verizon VA's accounts until year two. (VZ-VA Ex. 122 at 88-89; Tr. at 4264-65.) Thus, as Mr. Sanford explained, "[t]here is no more reason to believe that the 1998 VRUC prices are artificially high than there is to believe that the 1997 VRUC prices are artificially low." (VZ-VA Ex. 122 at 93.)

In any event, to address the year-to-year variability and smooth out cost variations between cable sizes, Verizon VA performed a linear regression of average installed cable prices

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assumptions lead to patterns among the different VRUC cable prices. AT&T/WorldCom's analysis of these patterns in an effort to undermine the reliability of the VRUC data, however, misses the central point. In the aggregate, VRUC prices reflect the booked investment for each cable type. (Tr. at 4266.) Because the VRUC prices are averaged first through Verizon VA's linear regression analysis, and then through the process of calculating average loop investment across the entire network, there is no reason to believe that the patterns in the VRUC data produce any distortion in UNE loop rates.

across all three years that it included in its studies in order to produce a linear relationship of average installed investment across different cable sizes. (Tr. at 4266.) AT&T/WorldCom's proposal to perform that analysis without the 1998 data makes no sense whatsoever and would produce a substantial understatement of forward-looking costs. There simply is no basis in the record to conclude that any part of the VRUC data reflects anything other than actual investment levels experienced by Verizon VA, nor is there a better source of data for estimating Virginia-specific, forward-looking cable investment.

b) Verizon VA's Conduit and Pole Investment Inputs

To determine forward-looking conduit and pole investments, Verizon VA calculated its average per-unit installed investment (adjusted to 2001 dollars) for the period 1996-2000.[97/] As with cable investment data, conduit investment per duct-foot can vary significantly from year-to-year depending on the complexity of installation projects in a given year. For example, projects in urban areas typically involve greater restoration costs, as do projects in rocky terrain and projects requiring a greater number of manholes. (VZ-VA Ex. 122 at 101-02.) The average conduit investment per duct foot in any given year will vary depending on the particular mix of installation projects in that year, and thus a single year is likely not a sound basis for estimating a

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97/ Verizon VA began with its total conduit investment for the years 1996 through 2000. These investments were then adjusted to 2001 levels using Verizon VA-specific telephone plant indices and summed to produce a total, inflation-adjusted investment for the five-year period. The total, inflation-adjusted investment was then divided by the total duct-feet installed during that period to produce an average investment per duct-foot in 2001 dollars. (*See* VZ-VA Ex. 211, Worksheet 3.1 in VA Unbundled Loop Rev 011030/Common Input/3.1 Conduit Investment Unit Price .xls on CD #1.) Verizon used a similar approach for calculating average investment per pole in 2001 dollars. (*See* VZ-VA Ex. 211, Worksheet 2.1 in VA Unbundled Loop Rev 011030/Common Inputs/2.1 Pole Investments.xls on CD#1 (Nov. 1, 2001).)

network-wide average. Accordingly, Verizon VA used its average conduit investments across multiple years in order to obtain a representative average cost of installing conduit.

Petitioners' proposal to use only the least expensive year of Verizon VA's conduit investments, though for purportedly different reasons than their proposal to use only the least expensive year of VRUC cable prices, relies on the same refusal to acknowledge the underlying reasons for variation in installed investments from year-to-year. AT&T/WorldCom contend that Verizon VA's conduit investment data demonstrate "economies of scale" that produce lower costs per duct foot of installing conduit as the amount of conduit increases. (AT&T/WCom Ex. 12 at 40-41.) But AT&T/WorldCom's argument confuses correlation with causation.[98/] As Verizon VA's witnesses have explained, a variety of factors contribute to varying per-foot costs of installing conduit in a given year, none of which relate to the total amount of conduit installed in that year. Rather, as explained above, a year in which less conduit was installed might have been a year in which the conduit installation jobs were labor-intensive; a year in which more miles were installed might have fortuitously involved easier jobs. But the reverse might just as well have been true.

With respect to pole investments, AT&T/WorldCom do not even pretend to analyze Verizon VA's actual data.[99/] Rather than quibble with the accuracy or treatment of Verizon

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98/ Indeed, even the very correlation that AT&T/WorldCom cite in support of their argument is questionable at best. For example, AT&T/WorldCom's own testimony shows that Verizon VA installed approximately 26% *more* conduit in 1999 than in 2000, yet Verizon VA's 1999 costs per duct-foot were higher than its costs per duct-foot in 2001 dollars. (*See* AT&T/WCom Ex. 12 at 41.)

99/ Though pole investments do not typically show the same variability from year-to-year, Verizon used average pole investments during the same five-year period to determine forward-looking per-pole investments. Use of this average investment per pole actually produced a lower forward-looking investment ($1,006.62) than the data from the most recent of the five years

VA's pole expenses, AT&T/WorldCom simply disregard that data altogether, insisting that Verizon VA's pole investment data fail to reflect the "economies of scale" that Petitioners insist would characterize the construction of the imaginary, forward-looking network to be considered for TELRIC purposes. According to AT&T/WorldCom, Verizon VA's costs reflect the supposedly inefficient costs that attend "limited pole installations reflected in Verizon's historical data." (AT&T/WCom Ex. 12 at 42.) The alternative costs they propose are nearly 55% lower than even Verizon VA's *lowest* average per-pole investment for any of the years from 1996 through 2000.[100/]

AT&T/WorldCom's argument, however, defies common sense and Verizon VA's own experience. Though it may be true that, in principle, "a planned job that is staged and planned as part of a normal engineering process is usually going to be less costly than an emergency job," it is equally true "that the circumstances vary from job to job." (Tr. at 4095 (Gansert).) Moreover, the economies of installing poles all at one time diminish markedly if the pole installation job grows to a certain size. If the entire network worth of poles were being placed, as Petitioners necessarily assume, the huge material and overtime costs clearly would dwarf any savings. As Dr. Tardiff explained, "[w]hatever economies of scale you want to assume should not be false economies of scale, coming about from assuming you get certain efficiencies . . . [from] planting your poles all at one time, ignoring the fact that that really can't be done in the real world." (Tr. at 4100-01.) Verizon's own experience bears this out, as Mr. Gansert explained further:

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would have produced ($1,097.42.) (*See* VZ-VA Ex. 211, Worksheet 2.1 in VA Unbundled Loop Rev 011030/Common Inputs/2.1 Pole Investments.xls on CD#1 (Nov. 1, 2001).)

100/ The year 1997 happened to produce Verizon VA's lowest average, per-pole investment during this period. The average per-pole investment for that year, adjusted to 2001 dollars, was **[BEGIN VERIZON PROPRIETARY]** **[END VERIZON PROPRIETARY]**.

> [W]e had sort of a sad lesson about that because. . . . a few years back we had a tremendous ice storm in the Northeast. . . . [E]very Verizon worker that knew how to put a pole up was putting up every pole we could buy in North America. And believe me, those poles did not come cheap, and they were put up quite sequentially.

(Tr. at 4094.)

c) Verizon VA's Cable and Structure Investment Data Reflect Achievable Structure Sharing Opportunities.

Verizon VA's cable and structure investment data reflect the opportunities the company has enjoyed in the past to share structure costs with cable television operators and electric utilities, which likely produce an overly generous prediction of structure sharing opportunities in the future.[101/] Verizon VA's buried cable and conduit investments include only the trenching costs that Verizon VA actually has incurred and thus intrinsically reflect any sharing of trenching costs with third parties. (VZ-VA Ex. 122 at 146; Tr. at 4380.) Additionally, where a third party leases an already-installed duct from Verizon VA, that duct is treated as occupied for purposes of calculating Verizon VA's conduit utilization factor. As a result, the investment associated with that duct is not recovered from Petitioners through Verizon VA's investment per duct foot input in these proceedings.

AT&T/WorldCom argue that Verizon VA's investment figures should be revised to reflect a significant increase in sharing opportunities — reducing investments by up to 75% — for the forward-looking network. However, Petitioners present no evidence to support this assumption. When asked, neither Petitioner was willing to say anything about its own structure sharing experiences except that it had not shared trenches with Verizon in the past. (*See* VZ-VA

101/ For aerial cable, Verizon VA accounted for shared pole investment through the use of a pole sharing factor. AT&T/WorldCom do not challenge Verizon VA's pole sharing factor. (Tr. at 4377-78.)

Ex. 122 at 146-47.) In fact, when asked by Staff whether Petitioners had enjoyed the type of structure sharing opportunities that they propose and that AT&T/WorldCom witness Mr. Riolo described, Mr. Riolo was forced to admit that he simply had no idea. (Tr. at 4547.)

Despite Mr. Riolo's rather wild speculations about sharing — he suggests, for example, that in some cases "20 to 30 people"[102/] are available to share trenching costs (Tr. at 4384-85) — Ms. Murray conceded at the hearing that the only relevant analysis is the determination of "the manner in which structure sharing opportunities will *actually* be available to companies such as Verizon." (Tr. at 3218 (emphasis added).) In response to Staff questions, Ms. Murray further agreed that it would make sense to look at the sharing that the incumbent is experiencing today. (Tr. at 3218-19.) Yet, if that is the analysis, Verizon VA's cable and structure investments should not be adjusted to reflect additional structure sharing at all, as they already reflect the limited structure sharing that Verizon VA has been able to achieve to date. As Mr. Gansert explained, structure sharing has been rare because, in most cases, entities can simply lease Verizon VA's conduit after Verizon VA alone has borne all structure installation costs:

> We are postulating that [third parties] would voluntarily and willingly and enthusiastically want to absorb an equal share of the costs from us. There is absolutely no economic motivation for anyone [to share trenches for conduit.] [I]n fact, they would have to be irrational to do that since there [are] extraordinarily reasonable conduit rental rates imposed on us so that we have to make our conduits available to other people. . . . We are going to build the trench, and we are going to pay for it, and they might make a deal with us to put something in there, but they sure as heck are not going to pay on half the cost.

[102/] Apparently, Mr. Riolo believes that among the "20 to 30 people" ready to absorb the significant costs of trenching with Verizon are fire departments, school systems, and municipal agencies, an assertion that strains credulity, given that the budgets of such entities and the below-cost conduit leasing rates imposed on Verizon VA make structure *leasing* a far more plausible option. (Tr. at 4385-86.)

(Tr. at 4387.)

Ms. Murray alternatively suggested that the new entrant's structure sharing opportunities would mirror Verizon's experience with structure sharing in connection with plant placed in new developments. (Tr. at 3219.) But the suggestion that Verizon's experience in new developments is a good proxy for construction and sharing in the forward-looking network is simply absurd. When plant is placed in a new development, there may in fact be a utility that needs to reach the same new neighborhood and is willing to share the trenching costs with Verizon as it lays cable to the area. But the network of the future postulated by Petitioners would logically be built in the real world in which other utilities' networks already are in the ground in all existing neighborhoods; thus, unless AT&T/WorldCom believe that TELRIC wipes the slate clean for all utilities (requiring that Pepco, too rebuild its entire network), the hypothetical new entrant would experience few structure sharing opportunities, except in those circumstances where the utilities do not already have facilities — in other words, the new entrant's structure sharing opportunities would be quite similar to, or even more limited than, Verizon VA's. As Dr. Tardiff explained:

> This discussion indicates that to consider sharing hypothetically almost presupposes the notion that not only do you have a hypothetical new entrant in the phone business, but simultaneous hypothetical entrants in all the other utility businesses as well, so there is a coincidence in time where the sharing is possible. And I think when you take that into account, Dr. Shelanski's argument that you're not going to go much beyond what's already there in the existing network and existing areas makes even more sense.

(Tr. at 3225.) Referring to this charitably as a "philosophical argument," Dr. Tardiff reiterated, "certainly the utilities that are out there in the world today are not going to move over to Verizon's newly constructed routes." (Tr. at 4383.) Ms. Murray ultimately conceded that Petitioners' approach is "a little bit complicated as a conceptual matter," and "that [she hadn't] thought through precisely how one would do that." (Tr. at 3222-23.)